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ON THE HABITS OF TRICHOSURUS VULPECULA

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[*Plate 13*]

There are but few Australian marsupials to which the term common or abundant can properly be applied today. It is difficult for any mammalogist, who has only a text book knowledge of the Australian marsupial fauna, to realize how rapidly are the closing scenes of extermination being enacted. More certainly, more swiftly, and withal more silently are the indigenous mammals of Australia passing into the category of the extinct, than are the inhabitants of any of the other large land masses of the globe. Large, conspicuous, and commercially valuable mammals are in some danger of extermination everywhere. But Australia holds this distinction; she is losing all her mammalian fauna from the largest and most conspicuous to the smallest and the most obscure.

There are several factors which combine to effect this wholesale destruction. First; the introduced carnivores, the fox and the cat, can outwit and destroy the native fauna wherever they come into contact. Second, the rabbit, the sheep and the cattle have raised the standard of competition for vegetable food to such a pitch that the herbivorous marsupials cannot survive in the struggle for existence. Third, such arboreal forms as are phytophagous, and are not subjected to this competition, are mostly valuable fur bearing animals, and it must be remembered that the fur trade of Australia is wholly destructive. The remaining factor is one due to geographical conformation and climate. In Asia, in Africa, in America and in Europe extermination of mammalian faunas is comparatively slow, since there are places

in the interior, wild regions in mountains, forests, swamps, and uncultivated yet fertile districts to which the animals, driven before advancing civilization, can retreat. So far as the western and southern parts of Australia are concerned these natural sanctuaries do not exist. The interior of the continent is not a place of refuge for the native fauna; it is a place in which competition for every blade of grass is raised to a standard unattainable by the very unsophisticated marsupial.

It may be said that the Australian marsupial has two slender chances of self preservation. It may be driven to the interior where in times of drought the severity of the struggle for food and water is marked by the carcasses of the introduced herbivores that have perished. Or it may be driven to the more populous districts where food is in comparative plenty; but where man, cats, and foxes are all intent upon compassing its destruction.

Among the animals that have chosen this last alternative, *Trichosurus vulpecula typicus* stands out conspicuously. Universally, and certainly permanently, known throughout Australia as the "opossum," this phalanger is to a great extent a suburban animal. In Adelaide at any rate, the opossum (for it is useless to persist in naming it the common, or vulpine phalanger) has adapted itself to modern circumstances better than any other marsupial. Wherever sufficient native timber has been permitted to remain, so as to afford a shelter, there will opossums be found. More than this, the animal has to a large extent adapted itself to become independent of the big eucalypti, in the holes of which it has its natural home. It has learned that the space under the roof of the usual type of suburban bungalow affords an excellent shelter and in such situations it freely takes up its residence. In this opossums have earned the ill will of the suburban householder, as their activities are nocturnal and noisy.

They are also in ill repute since disfiguring stains on ceilings often mark the site of their residences above, and contamination of gutters is an important thing in a place where water collected from the roof is of the utmost value. Moreover, the fondness of opossums for rose buds, and for the fresh young shoots of vines and fruit trees renders them unpopular with the suburban gardener. Practically every man's hand is against them, and yet they survive in a surprising way right up to the limits of the town.

Trichosurus is the only marsupial which seems to possess sufficient adaptive plasticity to be able to compete for survival in a suburban environment with any degree of success. And yet it must be owned

that an intimate acquaintance with the animal produces the impression that an inoffensive and stupid simplicity is the key note of its psychology. It is probably this simplicity which renders all opossums more or less tame, for there is very little difference in the degree of docility between a fresh caught adult and an animal which has been born and bred in captivity. A wild male has been in the habit of paying evening visits to my captive specimens, fearlessly coming into the outhouse in which their cages are placed. This visitor would permit me to approach and stroke it, but would not allow itself to be grasped or picked up. Freshly caught animals show practically no resentment of captivity, and when placed in a temporary cage are very reluctant to leave it for a larger and more comfortable one.

When handled, even when chased and captured, they, like most marsupials, remain silent; they will bite and scratch, and defend themselves stoutly, but as a rule they utter no cry. But though they are thus voiceless when molested by man, they are extremely noisy in their own domestic quarrels. The ordinary sound expressive of resentment, and a prelude to all encounters, is a long drawn inspiratory hiss. This hiss may die down as a harsh grunt, but when continued becomes increasingly high in pitch and may be modulated into a harsh cry, which rises to a raucous screech when the animals are fighting. During the breeding season, when fights are most common and the animals are most vocal, the male produces a curious sound like a sharp licking of the lips and a click of the tongue. So far, I have not heard a female produce this sound. The cry of the young when removed from the mother is extremely loud and quite peculiar, and can be described best by saying that it is so like the voice of the common South Australian tree frog that it is almost impossible to distinguish it from the frog's voice.

In fighting among themselves the opossums use the claws of the fore feet far more than the teeth, and although they often inflict scratches on each other and remove quantities of hair, even the noisiest encounters usually result in no great damage to the opponents. In performing the toilet of the fur, the palmar surfaces of the hands are licked, and the face is washed after the familiar manner of the cat. The fur of the rest of the body is combed with the syndactylous digits of the foot. The syndactylism of the digits is most certainly, in all the syndactylous marsupials that I have watched, a specialization of structure adapted to the toilet of the hair. The second and third pedal digits, with their parallel nails, constitute a hair comb, and as

such they find their functional homologues in the procumbent lower incisors of the lemurs, the crenated lower incisors of *Galeopithecus*, and the specialized hair-scratching nails and claws seen in many mammals.

The hair is raked through by this specialized hair comb, and then the comb is cleansed by the tongue and teeth. Not only is this toilet-use the obvious function of these digits, but it is the only function that they possess, so far as I can learn after hours of watching at all times and seasons.

Trichosurus is a skilled, but by no means a nimble climber. When alarmed it seeks to escape rather by remaining motionless than by the exhibition of any feat of exceptional activity. Its movements, as a rule, are slow and cautious, and great reliance is placed upon the grasp of the prehensile tip of the tail. It is rare to see the tail grip released until the creature is well satisfied that it has a firm hold by some other member. The foot with its highly specialized and nailless big toe is capable of taking a very firm hold, and descent is always made head downwards. The hands are always used for gathering food, and for holding it to the mouth when eating. Opossums are crepuscular feeders, eating directly they wake at dusk. Less than many other marsupials are they dependent upon the native Australian vegetation, for though they relish the pungent leaves of the eucalypti, they will eat almost any green leaves, and their great fondness for flowers is one of the reasons for their unpopularity. They drink but little and are quite independent of water when a plentiful supply of fresh green vegetation is to be had. When they do drink, they lap the fluid with great rapidity. Like wallabies and bandicoots they have the strange habit of licking their fur in very hot weather. The fore limbs especially are always kept wet when the animal is suffering from the extremely high summer temperatures.

Of its means of keeping in touch with its environment its auditory sense and its tactile sense apparently take first place. Its sense of hearing is remarkably acute. The long ears are pricked and mobile when the animal is active, but are folded during repose. The tactile areas of the rhinarium and the naked pads of the hands and feet, as well as the numerous sensory vibrissae on face and limbs, are evidently of the highest functional importance.

Vision, even during the time of the animal's highest activity, does not appear to be at all keen, and seems to be of secondary importance only. I have had a fine male, three parts grown, in which there was complete double congenital cataract. This specimen came to grief

by appearing abroad in full daylight and being caught by dogs, but from its fine condition it was evident that it had no difficulty in finding its way about and obtaining its food. As is not at all unnatural in an arboreal animal, the sense of smell is by no means highly developed, and it seems to be of but little importance in obtaining food or in avoiding enemies. The human scent appears to be in no way objectionable to the Australian opossum. It is astonishing how long it will take a captive animal to discover food placed in its cage when it is so situated as not to come into immediate contact with it. There is no doubt that captive animals can recognise the individual who habitually attends to them, but beyond that there is no advance in what may be termed the education of captivity.

The breeding season is in June. I have not been able to gather one scrap of evidence that the animal breeds twice in the year, though it is commonly asserted to do so. The animals begin to breed in the year following that in which they are born. The advent of the breeding season is marked by a conspicuous increase in the size of the testes in the male. So far, I have observed neither copulation nor birth, but a series of notes upon the reproduction of a pair in captivity may be of interest.

An old male, and a female of the previous year, were put together in May. The female was considerably smaller than the male, and for a month he bullied her rather badly. In June they were on better terms; but towards the end of the month the female became very savage with the male, and would not permit him to come near her. On June 23 the female was noticed licking her pouch, the opening of which she dilated with her hands. On June 25 she was seen to stretch the pouch open with her hands, and thrust her nose into the opening. This process was watched repeatedly; she would not permit me, however, to examine the pouch. Within a few days the quarrelling became so constant, and the attentions to the pouch so frequent, that on July 3 the male was removed from the cage. On July 17 I left Adelaide, and up to that time I was unable to examine the pouch or even to see into it while she opened it to lick it or thrust in her nose. On September 17 I returned. The female was walking with a distinctly waddling gait, and the pouch was obviously enlarged. She now permitted me to feel the exterior of the pouch, and the contained embryo was distinctly palpable. I could however get no view of it since the animal has voluntary control over the musculature of the pouch, and she contracted the mouth whenever I examined it.

On September 19, whilst she was feeding quietly, the mouth of the pouch was seen to dilate, and a part of a red, hairless embryo was seen. The pouch however contracted whenever I touched it. On September 23 the pouch again opened whilst she was being watched, and the embryo, now dusky with developing hair, was observed for a long while. At this stage, when the body first becomes clothed with hair, the pelage is of a uniform dusky brown. On October 4 the young one kicked both its hind legs out of the pouch, and when it had withdrawn them left its tail protruding. On October 9 it first left the pouch for a very short time. Its eyes were open; its dorsal surface was brown and its ventral surface yellow. The mother cleaned it by licking, as a cat cleans a kitten; she restrained its movements with her hands, and thrust it back into the pouch with her nose. It reappeared outside the pouch on the 10th, but for a short while only. For the next 4 days it did not come out of the pouch while the female was under observation, but on the 15th it came out and spent most of the day closely folded against its mother's ventral surface. On the 25th the mother first came out to feed leaving it behind in the sleeping box.

On the next day the young one was taken and examined and the mother showed no signs of resentment until it cried. It was a male, and it was difficult to believe that it and its mother belonged to the same species. It was covered with fine and close hair of a red brown colour, its dorsal surface being brown and its ventral surface a fine bright yellow tan. It clung remarkably tightly to its mother's dense fur, gripping the fur with its sharp claws, and encircling her body with its prehensile tail. By the end of October it could feed itself, but although growing rapidly it still spent a great part of its time in its mother's pouch. During the first week of November she showed signs of impatience with it and turned it away from the pouch with her nose when it attempted to get inside; though she still permitted it to insert its head for the purpose of suckling.

On November 16 I left Adelaide, and on my return on the 27th the young one was independent of its mother. Its appearance had altered. Its coat had become a good deal more woolly, and the grey tint of the adult was apparent along the middle of the back. This canescence appears to take place without any moult. By the end of the year it had completely lost its brown and tan colour, its coat had become gray and woolly all over, and it was in all respects save size similar to the adult. By the end of January it was practically as large as its mother.



FEMALE *TRICHOSURUS VULPECULA* WITH POUCH OPENED AND SHOWING THE
LARGE YOUNG



ADULT FEMALE *TRICHOSURUS VULPECULA*
Photos by F. Wood Jones

(Jones: Habits of *Trichosurus vulpecula*.)

It is usually said that four nipples are present in the female of *Trichosurus*. It is well known that the number of nipples is subject to considerable variation in several Australian marsupials; no specimen of *Trichosurus* that I have so far examined has had more than two. It is also often said that two young are produced at a time. I have handled a very large number of embryos and so far have not met with a case in which more than one was present.

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